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C-A OPERATIONS PROCEDURES MANUAL

9.5.6 ALARA Optimization And Cost Benefit

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Hand Processed Changes

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Collider-Accelerator Department Chairman Date

C. Schaefer

9.5.6 ALARA Optimization And Cost Benefit

1. Purpose

To compare dose savings over the life of a system/component to the cost of the design, installation and maintenance. Cost-benefit analysis is a technique which helps optimize a given radiation protection practice or which can be used to select between proposed practices.

2. Responsibilities

2.1 The cognizant engineer and/or physicist, with the help of ALARA Committee members, are responsible for carrying out the analysis.

2.2 The ALARA Committee Chair shall perform a qualitative analysis for each new design or installer. Alternatively, the ALARA Committee Chair may elect to do a quantitative analysis.

3. Prerequisites

None.

4. Precautions

4.1 An adopted practice shall not cause, or deem to cause, an individual to exceed an Administrative Control Level without an appropriate documented justification.

5. Procedure

5.1 The following considerations shall be addressed for qualitative approach to the analysis:

5.1.1 Identification of the problem
5.1.2 Recognition of the affected groups and their needs
5.1.3 Selection of the alternatives to be evaluated
5.1.4 Decision to select from the available alternatives

5.2 As an alternative, the succeeding analysis instructions may be used for a quantitative cost-benefit analysis.

5.2.1 Calculate the collective dose for the operation over the time period under consideration. The dose may be based on reports, operation and maintenance histories, survey results, occupancy, etc. as follows:

Person-rem/job x jobs/year x years = Collective Dose

5.2.2 Calculate the collective dose for the same period considering the alternative that employs a dose reduction option. The alternative also may be justified if it can enhance system safety, reliability, etc. If an alternative does not exist, a quantitative cost-benefit analysis is not warranted.

5.3 For quantitative analysis, evaluate the cost of each alternative in terms of:

5.3.1 Manpower requirements
5.3.2 Design and engineering cost
5.3.3 Operating and maintenance cost
5.3.4 Retirement and disposal cost
5.3.5 Radiation exposure to implement alternative and to dispose of equipment and facilities.

Note:

The previous instructions have ignored the variation of the cost of money in time. These cost estimates make no distinction between alternatives with higher capital costs and lower operating and maintenance costs and those with lower capital costs and higher operating and maintenance costs. If the crude cost analysis is not adequate, perform a "present worth" evaluation and/or annualized cost estimate, as needed. These will be used to compare alternatives. Present worth evaluations group all costs incurred in future times to a single cost at the onset of alternative implementation.

5.4 For purposes of quantitative cost-benefit analysis, a value of $11,000 per person-rem shall be used.

5.4.1 For each alternative, multiply step 5.2.1 times $11,000/person-rem. Compare this value with the cost of the alternative. Select the appropriate alternative and briefly explain the basis in order to amplify the difference between the selected alternative and the other alternative(s).

6. Documentation

6.1 Copies of cost benefit analyses shall be maintained in the C-A ALARA files.

7. References

7.1 ES&H Standard 3.1.1, Excellence in Radiological Control

7.2 ES&H Standard 3.1.3, Conduct of Radiological Work

7.3 BNL Procedure HP-SOP-009, ALARA Optimization

7.4 BNL Procedure HP-SOP-012, Health Physics Group Design Review

8. Attachments

None.